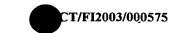
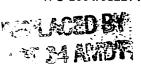


5



- 13. A substrate according to claim 12 when dependent on claim 11 wherein the active area on the other side of the substrate is a cathode.
- 14. A substrate according to any one of claims 1 to 13 wherein there is provided a plurality of semiconductor devices and a plurality of conductive vias for connecting an active area of semiconductor devices on one surface of the substrate to another surface of the substrate.
- 15.A substrate according to claim 14 wherein the plurality of semiconductor devices are formed as an array.
- 16.A substrate according to claim 14 or claim 15 wherein there is provided a conductive via for each semiconductor device.
  - 17. A substrate according to any one of claims 14 to 16 wherein the active areas of each semiconductor device are provided on the same side of the substrate.
  - 18. A substrate according to any one of claims 1 to 17 wherein the semiconductor device is a photodiode.
- 15 19.A substrate according to claim 18 wherein the semiconductor device is a photodiode of a medical imaging system.
  - 20. A substrate according to claim 19 wherein the medical imaging system is a computed tomography system.
- 21. A photo-detector array including a plurality of sub-arrays of photo-detectors, the photo-detectors of each sub-array being formed on a substrate with an active area of each photo-detector being formed on a surface of the substrate, there further being formed for each photo-detector a conductive via through the substrate from an upper surface thereof to a lower surface thereof to connect the active area of each photo-detector to the lower surface of the substrate, wherein a plurality of said sub-arrays of photo-detectors are placed adjacent to each other in a matrix to form the photo-detector array.
  - 22.A photo-detector according to claim 21 wherein the matrix extends in two directions.
- 23. An imaging system comprising: a radiation detector including a photo detector array according to claim 21 or claim 22, a radiation source facing the radiation



detector, and means for controlling the radiation detector and the radiation source.

- 24. An imaging system according to claim 23 wherein the radiation source is an X-ray tube equipped with a high-voltage generator.
- 5 25.An imaging system according to claim 23 or claim 24 wherein the radiation detector and the radiation source are radially mounted in a cylindrical scanning structure.
  - 26.An imaging system according to any one of claims 23 to 25 wherein the means for controlling comprises a computer system.
- 27.A method of manufacturing a semiconductor device comprising: providing an active area of the semiconductor device on one surface of a substrate; forming a conductive via through the semiconductor device from the one surface of the substrate to another surface of the substrate; and connecting the active area to the conductive via such that the active area is connected to the other surface of the substrate.
  - 28.A method according to claim 27 further comprising the step of electrically isolating the conductive via from the substrate.
  - 29.A method according to claim 27 or claim 28 wherein the conductive via comprises polysilicon.
- 20 30.A method according to claim 29 further comprising the step of forming polysilicon on the inner walls of the via.
  - 31.A method according to claim 30 further comprising the step of providing a further conductive element from one side of the substrate to the other within the conductive via.
- 25 32.A method according to claim 30 further comprising the step of providing a filling material within the conductive via.
  - 33. A method according to any one of claims 27 to 32 further comprising the step of providing a further conductive element connected between the active area of the device and the conductive via.



5

20

- 34.A method according to any one of claims 27 to 33 further comprising the step of providing a further conductive element on the other side of the substrate connected to the conductive via.
- 35.A method according to claim 33 wherein the further conductive element is a contact pad.
  - 36.A method according to claim 34 or claim 35 wherein the further conductive element on the other side of the substrate is provided for making an off-chip connection to the conductive via.
- 37. A method according to any one of claims 27 to 36 wherein the semiconductor device is a photodiode.
  - 38. A method according to claim 37 wherein the active area on the one surface of the device is an anode.
  - 39. A method according to any one of claims 27 to 38 further comprising the step of providing a further active area on the other side of the substrate.
- 40. A method according to claim 39 when dependent on claim 38 wherein the active area on the other side of the substrate is a cathode.
  - 41.A method according to any one of claims 27 to 40 further comprising the step of providing a plurality of semiconductor devices and a plurality of conductive vias for connecting an active area of semiconductor devices on one surface of the substrate to another surface of the substrate.
  - 42. A method according to claim 41 wherein the plurality of semiconductor devices are formed as an array.
  - 43.A method according to claim 41 or claim 42 wherein there is formed a conductive via for each semiconductor device.
- 44. A method according to any one of claims 41 to 43 wherein the active areas of each semiconductor device are formed on the same side of the substrate.
  - 45.A substrate according to any one of claims 27 to 44 wherein the semiconductor device is a photodiode.
- 46.A method according to claim 45 wherein the semiconductor device is a photodiode of a medical imaging system.



- 47.A method according to claim 46 wherein the medical imaging system is a computed tomography system:
  - 48. A method as substantially described herein with reference to, or as shown in, any one of Figures 2 to 18.
- 5 49. A semiconductor device or substrate substantially as described herein with reference to, or as shown in, any one of Figures 2 to 18.
  - 50. A medical imaging system substantially as described herein with reference to or as shown in any one of Figures 2 to 18.
  - 51. A method as substantially described herein.
- 10 52. A semiconductor device or substrate substantially as described herein.
  - 53. A medical imaging system substantially as described herein.

## INTERNATIONAL SEARCH REPORT

Internation Application No. PCT/FI 03/00575

A CLASSIFICATION OF SUBJECT MATTER
IPC 7 H01L31/101 H01L31/0352 H01L23/48

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols) I PC 7 H01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

	ata base consulted during the international search (name of d ternal, PAJ	ala case and, where practical, search terms used)		
C. DOCUM	ENTS CONSIDERED TO BE RELEVANT			
Category °	Citation of document, with indication, where appropriate, of	the relevant passages	Refevant to claim No.	
			<u> </u>	
X	WO 98 54554 A (HILSUM CYRIL ;SECR DEFENCE (GB); WATTON REX (GB)) 3 December 1998 (1998-12-03) page 3, line 21 - line 29		1-4, 14-17, 27-30, 41-44	
	column 7, line 25 -column 12, figures 1,2	line 31;		
Y			5,6,31, 32	
x	PATENT ABSTRACTS OF JAPAN vol. 1999, no. 14, 22 December 1999 (1999-12-22) & JP 11 261086 A (SHARP CORP) 24 September 1999 (1999-09-24 abstract	•	1,27	
X Furti	her documents are listed in the continuation of box C.	-/    X   Patent family members are listed	in annex.	
	thereades of eited decuments :	12.1		
<ul> <li>Special categories of cited documents:</li> <li>"A" document defining the general state of the art which is not considered to be of particular relevance</li> <li>"E" earlier document but published on or after the international filing date</li> <li>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</li> <li>"O" document referring to an oral disclosure, use, exhibition or other means</li> <li>"P" document published prior to the international filing date but later than the priority date claimed</li> </ul>		or priority date and not in conflict with cited to understand the principle or the invention  "X" document of particular relevance; the cannot be considered novel or cannot involve an inventive step when the do "Y" document of particular relevance; the cannot be considered to involve an indecument is combined with one or ments, such combination being obvious in the art.	<ul> <li>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</li> <li>"Y" document of particular relevance; the claimed Invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</li> <li>"&amp;" document member of the same patent family</li> </ul>	
Date of the	actual completion of the international search	Date of mailing of the international sea	irch report	
1 October 2003		23 10	2 3 10 2003	
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,		Authorized officer	Authorized officer FREDRIK WAHLIN/MN	
	Fax: (+31-70) 340-3016			

## INTERNATIONAL SEARCH REPORT

PCT/F1 03/00575

		PCT/F1 03/005/5			
C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT  Category Citation of document, with indication, where appropriate, of the relevant passages  Relevant to claim No.					
Category °	Outdoor of document, with indications, where appropriate, of the relevant passages	Tion to the state of the state			
Y	US 5 599 744 A (MCCAUSLAND CONNIE S ET AL) 4 February 1997 (1997-02-04) column 1, line 18 -column 2, line 32 column 3, line 60 -column 4, line 56 column 7, line 13 - line 40; figure 1	5,6,31, 32			
A	US 6 173 031 B1 (KOTIAN FRANCOIS ET AL) 9 January 2001 (2001-01-09) column 1, line 60 -column 2, line 35 column 3, line 37 -column 4, line 27; figures 3,4	1-53			
A	US 6 396 898 B1 (SAITO YASUO ET AL) 28 May 2002 (2002-05-28) column 2, line 19 - line 38	1-53			
	-				
		·			



INTERNATIONAL SEARCH REPORT

mation on patent family members

PCT/FI 03/00575

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9854554 A	03-12-1998	AU 732258 B2 AU 7439898 A EP 0985137 A1 WO 9854554 A1 JP 2002500763 T US 6388256 B1	12-04-2001 30-12-1998 15-03-2000 03-12-1998 08-01-2002 14-05-2002
JP 11261086 A	24-09-1999	NONE	
US 5599744 A	04-02-1997	CA 2211913 A1 EP 0815591 A2 FI 973239 A JP 11500867 T WO 9630932 A2 US 5717247 A	03-10-1996 07-01-1998 06-08-1997 19-01-1999 03-10-1996 10-02-1998
US 6173031 B1	09-01-2001	DE 19839786 A1 JP 11221207 A	27-05-1999 17-08-1999
US 6396898 B1	28-05-2002	JP 2001242253 A US 2002110216 A1	07-09-2001 15-08-2002